



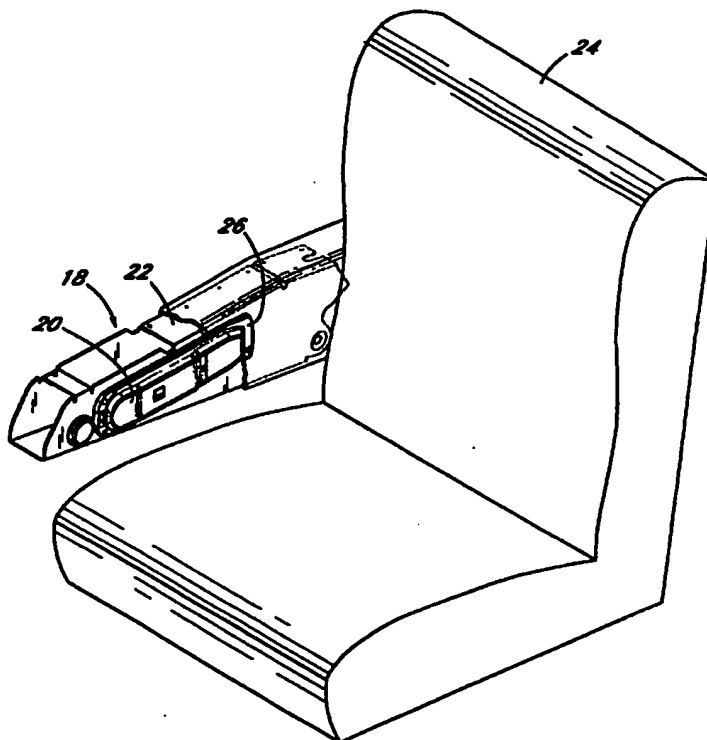
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: AIRPLANE TELEPHONE

## (57) Abstract

A telephone handset (20) designed to be installed in the armrest (22) of a conventional airplane coach seat (24). The telephone handset (20) preferably comprises voice pickup and speaker features, conventional twelve key push button telephone keypad (32) and a credit card reader (46). The telephone handset (20) is sized to fit within a cradle (26) which is installed into armrest (22) such that telephone handset (20) extends upward from armrest (22) by no more than approximately 0.5 inches. Each passenger is provided with their own telephone handset (20) mounted in their respective armrest (22). The handset (20) includes other functions such as a flight attendant call button (104), a cancel flight attendant call button (106), a light switch (108), radio/television controls, such as a channel control (110), a channel display (112) and a volume control (114), can be incorporated into the handset (20) to provide easy access to these buttons on the armrest (22). Further features can include video game controls, i.e. directional control (124), game selection keys (126) and trigger keys (128).



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## AIRPLANE TELEPHONE

### Related Applications

5 This application is a continuation-in-part application of co-pending design application, entitled "Airline Telephone Headset Design," filed on April 21, 1994.

### Background of the Invention

The present invention relates generally to the field of telephone units for passenger use in commercial aircraft.

10 As is well known to most commercial air travelers, space is at a premium on a commercial aircraft, because airline companies must maximize the number of passengers that each aircraft can accommodate. It is important that additional equipment used to provide features and services on the aircraft not impinge on space in the aircraft which could be used to accommodate passengers.

15 One service provided on airplanes which continues to increase in popularity is the availability of telephones which are radio-linked to standard ground-based long distance services. As the traveling public becomes more accustomed to the use of telephones on airplanes, it becomes desirable to provide a greater number of telephones on board airplanes without taking up any additional passenger space.

20 In the prior art, it has been common to install telephone units on the back of airline seats as well as in bulkhead walls near the front and rear of the airplane. Both of these locations avoid the use of critical passenger space. They accomplish this, however, at the expense of passenger convenience.

25 In situations where the telephones are placed in bulkheads, only one or two telephone units are usually provided for an entire group of passengers. Therefore, a passenger who needs to use the phone must disturb the passengers in his row to get up and locate the available telephone unit. Further, the passengers who are seated near the telephone units are disturbed each time a passenger wishes to use the telephone.

30 In situations where the telephones are located in a seat back, it is common to provide a single telephone unit for an entire row or group of passengers. Therefore, the passengers who do not have a telephone unit in front of them must disturb the passengers who are proximal to the phone to access the telephone to make their call.

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Even in those situations where each passenger is provided a telephone unit in the seat back of the next row, use of the telephones is somewhat inconvenient. In order to access the phone from the seat back, the user may disrupt the passenger sitting in the seat in which the telephone is installed. Moreover, since the telephone is connected by a cord to its receptacle, the cord stretches between the seat rows when the phone is in use. Therefore, when a phone is being used, passengers cannot pass from their seat to the aisle past the seat where the caller is sitting. Therefore, it is desirable to find an alternate location in which the telephone unit can be installed, however, in most airplanes there is not an abundance of excess space in which a telephone unit could be installed.

Since size is not a major constraint in locating the telephone units in the seat backs of the airplanes, the size of the airplane telephone units in the prior art vary a great deal. The only major constraint in mounting a telephone in the seat back is the width of the seat back, i.e., to ensure that the telephone unit would not extend beyond the width of the seat back. The overall size of a conventional telephone unit mounted in a seat back or in the bulk head of an airplane is such that there are not many alternate locations that such a telephone unit can be located.

Therefore it would be desirable to design a telephone unit which can be located in a small area somewhere in the airplane such that each passenger could have access to a telephone unit without disturbing other passengers in order to access the unit.

An additional problem relating to the installation of passenger service features on airplanes relates to maintenance. In order for an airline to operate profitably, it must reduce, as far as possible, aircraft down-time. As passenger amenities proliferate, they also add to maintenance difficulties, since each new system installed at each passenger seat location has the potential to malfunction. When enough malfunctions occur, the aircraft must be taken out of service long enough to affect repairs.

Commonly, passenger amenities are distributed in several locations around the passenger seat. Often, the flight attendant call button is in a panel overhead, along with light switches and reading lights. Telephones are commonly in seat backs, along with video screens in those instances where they are installed. Audio controls, such as volume and channel controls, are often in the armrest, where light control and flight

attendant call buttons are sometimes also located. When video game controllers are installed, these are also often installed in the armrest. This distribution of components, each having the potential for malfunction, increases the complexity of aircraft maintenance and thus the cost to the airline. Since repairs on most of these systems requires that the malfunctioning unit be removed and replaced, so that it can be fixed without causing flight delays, the removal of several different systems in several different locations increases the number of replacement parts which the airline must keep in stock, and increases the cost to the airline for training personnel to remove and replace each component.

Therefore, it would be advantageous to have an all-purpose controller/telephone unit which could be easily replaced by untrained personnel and which would control as many of the passenger amenities as possible.

#### Summary of the Invention

A preferred embodiment of the passenger telephone of the present invention is a telephone unit designed such that a telephone receiver may be installed in the arm rest of a conventional coach- or tourist-class seat of an airplane. It is, of course, in this section of the airplane where space is at the greatest premium, and where the airline must accommodate as many passengers as possible.

A preferred embodiment of the passenger telephone unit for an airliner comprises a standard coach passenger seat having a retractable armrest on at least one side thereof; a cradle forming an open cavity and having a hold down member; and a telephone receiver handset mounted in the open cavity of the cradle. Preferably, the telephone receiver handset is sized to fit within the cradle which is installed in the arm rest such that the telephone handset extends outward from the side of the armrest by no more than approximately 0.5 inches. This assures that the seating area for the passenger is not restricted. Preferably, the overall outside dimensions of the cradle which is mounted in the side of the armrest is less than 8.25 inches by 2.25 inches by 1.0 inches in width. The telephone receiver handset having overall outside dimensions of less than 7.25 inches by 2.0 inches by 2.0 inches by 1.5 inches and including a member which cooperates with the hold down member to hold the receiver in the cradle. The handset preferably comprises a twelve key keypad for inputting numbers

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to be called; a microphone located adjacent one end of the handset; a speaker located adjacent the other end of the handset; and a multi-conductor cord passing from the receiver into the armrest through the cradle.

5 Since the handset is capable of fitting within the arm rest of a conventional coach seat of an aircraft, preferably each passenger is provided with their own telephone handset which is mounted in their respective arm rest. This eliminates the need for the passenger to disturb his fellow passengers in order to have access to a telephone.

10 Desirably, since each passenger will be provided with a telephone handset in their arm rest, other functions to which each passenger may wish to have access can be incorporated onto the telephone handset. For example, functions typically associated with a digital passenger control unit (DPCU), such as a flight attendant call button, a flight attendant cancel button, and a personal lighting control for switching a passenger reading light, can be incorporated into the handset such that each passenger has easy access to these buttons on their arm rest. Other DPCU features, including radio or television controls, such as a channel control, a channel display and a volume control, 15 can also be incorporated onto the handset. Further, features such as a set of video game control switches, which may include, for example, cursor control switches, game select switches and direction keys, and fire control buttons, may be incorporated onto the handset.

20 The handset is connected by a multi-wire cable to a retracting reel. Preferably, the connection to the cable is difficult enough to disconnect that passengers will not easily remove the handset from the airplane, yet still removable by aircraft maintenance personnel with very little training and without specialized equipment. This permits such personnel to replace, in a simple manner, virtually all of the passenger control elements, 25 so that faulty switches or components may be repaired without delaying the airplane. Since virtually all controls are placed in a single handset, the airline need only stock this one control element to repair most malfunctions in the passenger accommodation controls.

30 These and other features and advantages of the present invention are set forth more completely in the accompanying drawings and the following description.

### Brief Description of the Drawings

Figure 1 is a perspective view of a first embodiment of the telephone handset installed in a cradle in a conventional coach-class airplane seat.

5      Figure 2 is a perspective view of the first embodiment of the telephone receiver handset removed from the cradle.

Figure 3 is bottom plan view of the first embodiment of the telephone handset.

Figure 4 is top plan view of the first embodiment of the telephone handset.

Figure 5 is right side view of the first embodiment of the telephone handset.

Figure 6 is left side view of the first embodiment of the telephone handset.

10      Figure 7 is a side view of the first embodiment of the handset connected to a cord reel.

Figure 8 is an exploded perspective view of the passengers seat illustrating the location of the cord reel which is connected to the first embodiment of the handset in an under seat installation of the cord reel.

15      Figure 9 is a more detailed exploded perspective view of the first embodiment of the handset, the cradle and the flexible conduit surrounding the telephone connection cord as illustrated in Figure 8.

Figure 10 is an exploded perspective view of the passengers seat illustrating the location of the cord reel which is connected to the fourth embodiment of the handset in an armrest installation of the cord reel.

20      Figure 11 is a top plan view of a second embodiment of the handset which includes digital passenger control functions thereon;

Figure 12 is a top plan view of a fourth embodiment of the handset which includes digital passenger control functions as well as video game controls thereon; and

25      Figure 13 is a top plan view of a third embodiment of the handset which includes video game controls thereon.

### Detailed Description of the Preferred Embodiments

As illustrated in Figure 1, a first embodiment of the telephone unit 18 of the present invention comprises a telephone receiver handset 20, which may be installed in  
30      a standard coach passenger seat 24 having a retractable armrest 22 on at least one side thereof. More preferably, the telephone receiver handset 20 is sized to fit within a

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cradle 26 that is mounted in the side of an armrest 22 such that the telephone handset 20 extends outward from the cradle 26 in the armrest 22 by no more than approximately 0.5 inches to avoid impinging on the leg room of the passenger.

5 Since the dimensions of coach-class, or tourist-class, passenger seats 24 vary with the manufacturer, the handset 20 has been designed to fit within the armrest 22 of a coach-class seat 24 made by a majority of the airline seat manufacturers. The smallest armrest 22 configuration that the telephone receiver handset 20 of the present invention will fit within, without requiring modification to the size of the armrest 22, is a coach-class seat manufactured by PTC Corporation, which is a wholly owned subsidiary of BE Aerospace Corporation. Preferably, the dimensions of the cradle 26, 10 which is capable of being installed in the armrest 22 of a conventional coach seat 24, is no greater than 8.25 inches in length X 2.25 inches in height X 1.0 inches in width. The dimensions of the telephone handset 20, which is substantially housed in the cradle 26 in the armrest 22 of a conventional coach seat 24, preferably measures less than 7.25 inches in length X 2.0 inches in height X 1.5 inches in width. More preferably, the dimensions of the cradle 26, which is capable of being installed in the armrest 22 of a conventional coach seat 26, measures approximately 8.205 inches in length X 2.1 inches in width X 0.97 inches height. More preferably, the dimensions of the telephone handset 20, which is substantially housed in the cradle 26 in the armrest 22 of a conventional coach seat 24, preferably measures approximately 7.1 inches in length X 1.76 inches in width X 1.29 inches in height. Utilizing the more preferred dimensions of the cradle 26 and the more preferred dimensions of the telephone handset 20, the telephone handset 20 will be substantially contained within the cradle 26 except for a portion of the telephone handset 20 measuring approximately 0.32 inches in height, 20 which extends outward from the cradle 26 in the armrest 22.

As will be easily recognized by those of skill in the telephone art, the dimensions for the handset 20 given above are much smaller than the preferred standard ergonomic design of a telephone handset in a number of ways. First, the length of the airplane handset 20, which defines the distance between the microphone voice pickup unit and the speaker in the earpiece, is significantly shorter than the preferred distance 30 of a typical telephone handset. In addition, the width of the airplane telephone handset



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20, which determines the width of the telephone keypad, is significantly smaller than the preferred keypad width of a typical telephone handset. In order to overcome these design constraints while providing a telephone handset which functions properly, many standard features of a telephone handset design had to be reinterpreted.

5           A first embodiment of the telephone handset 20, as illustrated in Figures 2-6, preferably comprises the following features of a typical telephone handset: a microphone 28, an earpiece 30 having a speaker therein, a 12-key telephone keypad 32, and a volume control 34. In addition, the handset also comprises a plurality of function control buttons 36, such as a start/stop control button to begin and end a series of calls  
10           that are charged to one caller, a new call button such that the caller can initiate a new call which is charged to the same credit card number, and a function key which is used to enable access to upgraded features which may be added to the telephone unit in the future. The telephone handset additionally comprises an LED display panel 38, which indicates the status of the telephone call. The LED display panel 38 may comprise  
15           indication features such as a first display 40, which indicates when a channel is available; a second display 42, which indicates when an error has been made in the calling sequence; and a third display 44, which indicates when the user must wait before initiating the next step in the calling process. Finally, the handset additionally comprises a credit card reader unit 46. The credit card reader unit 46 provides the user  
20           with a convenient method of payment for his use of the telephone; however, the space required for the credit card reader unit 46 also reduces the amount of space available for the above listed telephone features.

          The credit card reader unit 46 comprises a trough 48 with a magnetic card reader 50 therein, positioned in one side 52 of the telephone handset 20. The credit card is  
25           inserted into the trough 48 and is swiped longitudinally along the trough 48, such that the magnetic strip of the credit card passes across the card reader 50. The width of the trough 48 is defined by the location of the magnetic strip on a typical credit card; therefore, the trough 48 has to have this minimum width in order to perform its function. The required trough width reduces the amount of area in the telephone  
30           handset 20 that is available for the telephone electronics. In addition, physical, electrical, and magnetic isolation are provided to prevent the magnetic strip of the credit

card from interfering with the telephone electronics in the handset 20. Preferably, the trough 48 is shielded from the internal handset electronics with the exception of the magnetic card reader 50 itself, which extends into the trough 48 in order to read the magnetic strip of the credit card.

5           Due to the reduction of space available in the telephone handset 20, the keypad 32 of the handset 20 is greatly reduced in size while still enabling the required functions to be performed. The preferred center-to-center distance between the keys 54 in the keypad 32 used in the handset 20 is greatly reduced in size over a conventional telephone keypad; i.e., the keys are placed closer together than on a typical telephone  
10           keypad. In addition, the actual size of the keys 54 in the keypad 32 of the handset 20 are reduced from the standard telephone keys. The keys 54 are preferably formed from conductive silicone rubber and mate with a keypad connection PCB, which is positioned below the key pads. When the keys 54 are depressed, the conductive silicone keys form an electrical connection with the keypad PCB matrix, which indicates to the  
15           telephone electronics when a key has been depressed. In addition, the silicone rubber keys 54, despite the fact that they are extremely small, are designed to provide the necessary tactile feel for the user to know when the key 54 has been depressed and has made contact with the key switch membrane mounted below the silicone keys 54.

          Further, a commercial airplane which may be operated at night needs a keypad  
20           32, which is provided with a back lighting feature to enable the user to use the telephone handset 20 in an dark airplane cabin. Preferably, the silicone keys 54 are translucent, such that a light source positioned behind the keys 54 will illuminate the key 54. The area around each key is provided with an opaque mask such that each key 54 will be individually illuminated and easily definable from the other keys 54 proximal  
25           thereto. The key identifier 56, such as numbers, letters, and/or symbols, is imprinted with an opaque ink on the top surface of the key 54. When the key 54 is illuminated, the opaque identifiers 56 will be easily discernable over the illuminated key 54.

          As illustrated in Figure 7, the first embodiment of the handset 20 is connected to one end 58 of an multi-conductor cord 60 that is wound around and maintained  
30           within the cord reel housing 62 when the cord 60 is not extended during use. Preferably, the cord reel housing 62 is sized depending upon the mounting location and

the amount of cord that it is required to hold. Desirably, a first embodiment of the cord reel 62 is 3.5 inches in diameter and may hold up to 60 inches of cord 60. A second embodiment of the cord reel 62 is 2.5 inches in diameter and may hold up to 40 inches of cord 60. Preferably, as the cord 60 extends from the cord reel 62 the cord 60 is  
5 encased within a flexible conduit 68. An opposite end of the multi-conductor cord 60 contained within the housing 62 is connected via an electrical connector 64 to a portion of the main telephone electronics control system which controls the operation of the telephone handsets 20 in the airplane. Preferably, a portion of the main telephone electronics control system is located under one of the seats (Figure 1) in a group of  
10 seats; therefore, the connection of the electrical connector 64 from the cord reel 62 to the portion of the telephone electronics control system located under the seat is not complicated. The cord reel 62 provides a convenient storage means for a substantial length of the multi-conductor cord 60 such that the telephone handset 20 can be lifted up from the armrest (Figure 1) to extend to the ear of a user. In addition, the cord reel  
15 62 provides a convenient storage means for a sufficient length of the cord 60 such that the cord reel 62 may be mounted in a variety of locations proximal to the armrest and still provide the user with a sufficient length of cord 60 to the handset 20 to reach a variety of locations proximal to his armrest and remain at that desired location without any resistive force pulling on the handset 20. Additionally, because the passenger has  
20 control over the length of cord 60 that extends from the reel 62, excessive lengths of the cord 60 do not hang down from the handset 20, so that it can unintentionally get caught between the seats, between the telephone handset and the cradle, or on a portion of the armrest.

Preferably, as illustrated in Figure 8, the cord reel 62 is designed such that when  
25 the telephone handset 20 is pulled from the cradle 26 in the armrest 22, the cord 60 extends as the user pulls on the handset 20. Once the user pulls the handset 20 to the desired location and stops, a locking mechanism on the cord reel 62 engages and temporarily fixes the useable length of the electrical connection cord 20 to the preferred connector length of the user. When the user wants to return the handset 20 to the  
30 cradle 26 or wants to change the cord length, the user pulls the handset 20 away from the cradle 26, which will disengage the locking mechanism on the cord reel 62 and

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enable the length of the cord 60 to be extended or retracted. If the user pulls the handset 20 away from the cradle 26, the length of the cord 60 will again be extended. If the user does not hold the handset 20 away from the cradle 26 once the locking mechanism is disengaged, the multi-conductor cord 60 will be drawn back into the cord reel 62 as the handset 20 is drawn towards the cradle 26. This locking mechanism on the cord reel 62 is advantageous over other cord length controls on telephone handsets of the prior art that provide a constant retraction force on the cord 60, which tends to pull the handset 20 away from the user while the user is trying to make a call.

In one embodiment, as illustrated in Figure 8, the first embodiment of the cord reel 62 holding up to 60 inches of cord 60 is installed under the bottom cushion 66 of the passenger's seat 24 and is connected to a first embodiment of the handset 20, which is located in the armrest 22. The under-seat installation of the cord reel 62 is advantageously used in seat designs where the armrest 22 is extremely small, such that the handset 20 can be located in the armrest 22, but there is not enough additional space in the armrest 22 to mount the cord reel 62. The cord reel 62 is mounted in a bracket 67, which is attached to the bottom surface of the bottom cushion 66 of the seat 24. Preferably, the length of the cord 60 that extends from the cord reel 62 to the cradle 26 is encased within the flexible conduit 68 and protects the cord 60 from getting caught in the armrest 22 or under the seat 24 as it extends and retracts. The flexible conduit 68 is fed from the bottom cushion 66 of the seat 24 along one side of the seat back 70 and into the armrest 22 where the handset 20 is stored. As the handset 20 is removed from the armrest 22 and is moved around, the cord 60 in the cord reel 66 is unwound and is fed through the flexible conduit 68 and out an opening 72 in the cradle 26 to provide the length of the multi-conductor cord 60 that is required to provide the required freedom of movement of the handset 20. As will be understood by those of skill in the art, the second embodiment of the cord reel 62 may be located in any other suitable location proximal to the armrest 22 known to those of skill in the art in order to enable a handset of the present invention, such as a third embodiment of the handset 130, to be installed in each of the armrests 22 of coach-class airline seats 24.

Referring to Figure 9, the cradle 26 is a five-sided cavity 74 that is completely contained within the armrest 22 of the airline seat 24. The sixth side 76 of the cradle

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26 is open to a side portion 78 of the armrest 22 (Fig. 8) to enable the telephone handset 20 to be inserted into and substantially contained within the cradle 26. When the telephone handset 20 is inserted in the cradle 26, preferably a first end 80 of the telephone handset 20 is inserted into an opening at a first end 82 of the cradle 26. A  
5 second end 84 of the cradle 26 comprises a pivoting attachment or hold down member 86 having a flange 88 biased to extend perpendicularly into the cradle opening 76 to hold the telephone handset 20 within the cradle 26. A receiving groove 90 in a second end 92 of the telephone handset 20 mates with the flange 88 of the attachment member 86 to hold the handset 20 in the cradle 26. Preferably, the attachment member 86 is  
10 integrally formed with the cradle 26. The attachment member 86 is cantilever-mounted to the cradle 26 so that an upper end 85 is moveable due to relief slots 87 which separate the sides of the member 86 from the adjoining structure. The attachment member 86 is self-biasing into the locked position but is moveable;e outward against the structural web 89 to release the handset 20. Preferably along the perimeter of the  
15 cradle 26 a structural web 89 resides beneath the attachment member 86 and stabilizes the structure of the second end 84 of the cradle 86 adjoining the attachment member 86. A travel limiter 91 is mounted to the back of the attachment member to limit the actuation of the attachment member 86 in reverse of normal release to protect the attachment member from overstress and breakage. However, as will be recognized by  
20 one of skill in the art, any number of other attachment means may be utilized to hold the handset 20 substantially within the cradle 26 when the handset 20 is not in use.

In order to retrieve the telephone handset 20 from the cradle 26, the user depresses the pivoting attachment member 86 on the cradle 26, which upon depression retracts the attachment flange 88 from the receiving groove 90 on the handset 20 and  
25 releases the handset 20 from the cradle 26. Further, the cradle 26 comprises a spring-loaded ejection button 94 in the floor 96 of the cradle 26, which provided an ejection force on the handset 20 to urge the handset 20 out of the cradle 26. When the handset 20 is held in place by the attachment member 86 on the cradle 26, the spring in the ejection button 94 is compressed and the spring force is contained by the attachment  
30 member 86 holding the handset 20 within the cradle 26. Once the attachment member 86 is released from the handset 20, the spring force of the ejection button 94 urges the

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handset 20 is urged out of the cradle 26.

In another embodiment as illustrated in Figure 10, the second embodiment of the cord reel 62 is located within the armrest 22. The armrest installation of the cord reel 62 is used with seats 24 having armrests 22 with additional space therein to mount the cord reel 62. The armrest installation is preferable, as the entire electrical cord reel 62, cradle 26, and telephone handset 20 can be located in one location on the aircraft; i.e., within the armrest 22. Preferably, the length of the cord 60 that extends from the cord reel 62 to the cradle 26. As described above, a portion of the telephone electronics control system is mounted below one of the seats within a group of seats; therefore, an electrical connector (not shown) is required to connect the cord reel 62 within the armrest 22 to the electronics located under the seat 24.

Since the handset 20 is capable of fitting within the armrest 22 of a conventional coach-class seat 24 of an aircraft, preferably each passenger is provided with his own telephone handset 20 that is mounted in his respective armrest 22, and therefore does not have to disturb his fellow passengers in order to have access to a telephone. Further, by locating the telephone handset 20 in the armrest 22, the cord 60 attached to the handset 20 will not extend into the space of the other passengers or block the aisle, as in the prior art seat-back telephone handset systems.

Desirably, since each passenger will be provided with a telephone handset 20 in his armrest 22, other functions to which each passenger may wish to have access can be incorporated onto the telephone handset 20. As illustrated in Figure 11, a second embodiment 100 of the handset includes the functions of a digital passenger control unit (DPCU) 102 thereon. For example, the following functions from a digital passenger control unit (DPCU) 102 can be incorporated into the handset 100 to enable each passenger to have easy access to these buttons on their armrest 22: a flight attendant call button 104, a flight attendant cancel button 106, and a light switch 108. Other DPCU 102 features, including radio or television controls such as a channel control 110, a channel display 112, a volume control 114, and a TV power switch 116, can be incorporated onto the handset. Preferably, the DPCU functions 102 are implemented utilizing a plastic membrane-type switch pad. In a membrane-type switch pad, the upper membrane is flexible to actuate a typical button-type switch below the membrane.

As illustrated in Figure 13, a third embodiment of the handset includes video game controls. Video game controls comprise cursor control switches and game select switches. For example, video game control switches 122, such as a cursor-position adjustment device 124, game selection keys 126, and trigger keys 128, can be incorporated onto the handset 120. Preferably, the video game functions, such as the game selection keys 126 and trigger keys 128, are implemented utilizing hard cap keys with a rubber actuator-type spring mechanism. Preferably, all of the video game controls 122 comply with the Nintendo Super NES video game standard. As illustrated in Figure 12, a fourth embodiment 130 of the handset includes functions from the digital passenger control unit 102, as well as video game controls 122, as described above.

Advantageously, the handset is designed to enable a variety of control functions to be incorporated onto the handset in addition to the conventional telephone headset functions. Depending upon the type of aircraft in which the handsets are installed, a portion of or all of the additional functions discussed above may be incorporated onto the handset without taking up additional space on the airplane. By combining some of the DPCU functions with the telephone handset, the portion of space usually reserved for the DPCU functions for each passenger is now available for other uses. Therefore, the telephone handset of the present invention, while requiring very little additional space on the airplane, can be used to free up some other space normally reserved for these additional functions and may result in a net gain of available space on the aircraft while providing an additional service to the airline passenger.

An additional function that is incorporated onto the telephone unit of the present invention is a data connection port for facsimile and/or modem transfers. Referring to Figure 9, the cradle 26 includes an RJ-11 connector 140 in the floor 96 of the cradle 26, such that the user can connect a facsimile or modem device with a mating connector and send facsimile and modem data from the airplane to a receiving site on the ground. The RJ-11 connector 140 is preferably wired directly to the telephone control electronics which are located below the row of seats; i.e., the RJ-11 connector does not connect to the wires in the cord 60 on the handset which is wound around the cord reel 62.

As discussed above, an additional problem relating to the installation of passenger service features on airplanes relates to maintenance. In order for an airline to operate profitably, it must reduce, as far as possible, aircraft down-time. The telephone handset of the present invention is designed for quick servicing by separating the telephone unit into easily serviceable field replaceable units. Preferably, the telephone unit is separated into three separate field replaceable units, the handset, the cradle and the cord reel. As described above in association with Figure 9, the handset 20 is easily removable from the cradle 26 by disengaging the attachment member or hold-down mechanism 86; however, the cord 60, which is attached to the end of the handset 20, is still attached to the cord reel mechanism 62. The cord 60 terminates at an electrical connector 142, which connects to a mating connector (not shown) on the handset 20. The termination of the electrical connector 142 is encased in a mounting housing 146. The mounting housing 146 preferably includes a first extending pin 148 that mates with a slot 150 (see Figure 3) in the handset 20 to connect and hold the first end 58 of the cord 60 to the handset 20. To separate the handset 20 from the cord 60 and the cord reel mechanism 62, the mounting housing 146 is disengaged from the handset 20 to expose the first connection of the cord 60 to the handset 20. The electrical connector 142 on the end 58 of the cord 60 is detached from the mating connector (not shown) on the handset 20. Once the cord 60 is detached from the handset 20, the handset 20 can easily be replaced with another handset unit.

When the cord 60 is disconnected from the handset 20, the flexible conduit 68 in which the cord 60 lies remains connected to the cradle 26. In order to remove the cradle 26 or the cord reel 66, the connection of the flexible conduit 68 to the cradle 26 must be removed. Preferably, the conduit 68 is connected to the cradle 26 via a snap-on connector 152. The snap-on connector 152 mates with a receiving opening 72. Once the snap-on connector 152 is removed from the receiving opening 72 on the cradle 26, either the cradle 26 or the cord reel 62 can be easily replaced. Preferably, the cradle 26 is attached to the sheet metal of the armrest 22, as seen in Figure 10, by a rotating bolt and pawl assembly (not shown) at the location on the first end 82 of the cradle 26 and at two locations on the second end 85 of the cradle 26. In order to remove the cradle 26, the bolts are rotated in a counterclockwise direction, which



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releases the contact between the pawl and the armrest 22. Another cradle 26 can be inserted following the reverse steps as described above.

5 The cord reel 62 is either mounted within the armrest 22 or below the seat 24 and can easily be replaced as a single unit. The only complicated procedure involved in changing the cord reel 62 is that of feeding the flexible conduit 68, which contains  
10 the multi-conductor cord 60, through the armrest 22 and/or from below the seat 24 to the cradle 26 to which the flexible conduit 68 is connected. The multi-conductor cord 60 is then connected to the mating connector on the handset 20, as described above. Also, the mounting housing 146 on the cord 60 is snapped into place on the handset 20.  
15 Advantageously, the telephone unit of the present invention provides for easy replacability in case of a failure in any part of the system. Therefore, down-time attributable to a failure of the telephone system should be kept to a minimum.

Commonly passenger amenities are distributed in several locations around the passenger seat 24. Often, the flight attendant call button is in a panel overhead, along  
15 with light switches and reading lights. Telephones are commonly in seat backs, along with video screens in those instances where they are installed. Audio controls, such as volume and channel controls, are often in the armrest, where light control and flight attendant call buttons are sometimes also located. When video game controllers are installed, these are also often installed in the armrest. This distribution of components,  
20 each having the potential for malfunction, increases the complexity of aircraft maintenance and thus the cost to the airline. Since repairs on most of these systems requires that the malfunctioning unit be removed and replaced, so that it can be fixed without causing flight delays, the removal of several different systems in several different locations increases the number of replacement parts which the airline must  
25 keep in stock, and increases the cost to the airline for training personnel to remove and replace each component. Advantageously, the handset of the present invention combines many of the features of a digital passenger control unit and other passenger amenities described above such as television and video game controls along with a telephone handset into an all-purpose controller/telephone unit which can be easily  
30 replaced by untrained personnel. By reducing the number of replaceable units and making the replacement procedure as easy as possible for untrained personnel, the all-

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purpose controller/telephone unit of the present invention improves the overall reliability of the aircraft and reduces the amount of down-time required to service failures associated with the above functions.

5       The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

WHAT IS CLAIMED IS:

1. A passenger telephone for an airliner, comprising:

A standard coach passenger seat having a retractable armrest on at least one side thereof;

5 a cradle forming an open cavity and having a hold down member, said cradle having overall outside dimensions less than 8.25 by 2.25 by 1.0 inches mounted in the side of said armrest;

a telephone receiver handset mounted in said open cavity of said cradle, said receiver having overall outside dimensions less than 7.25 by 2.0 by 1.5 inches and including a member which cooperates with said hold down member to hold said receiver in said cradle, said handset comprising:

a twelve key keypad for inputting numbers to be called;

a microphone located adjacent one end of said handset;

a speaker located adjacent the other end of said handset; and

15 a multi-conductor cord passing from said receiver into said armrest through said cradle.

2. A passenger telephone for an airliner as defined in claim 1 wherein said handset additionally comprises:

20 a personal lighting control for switching a passenger reading light; and  
a flight attendant call button.

3. A passenger telephone for an airliner as defined in claim 2 wherein said handset additionally comprises:

a flight attendant cancel button.

4. A passenger telephone for an airliner as defined in claim 3 wherein said handset additionally comprises:

a volume control; and

a channel control.

5. A passenger telephone and control unit for an airliner, comprising:

30 A standard coach passenger seat having a retractable armrest on at least one side thereof;

a cradle forming an open cavity and having a hold down member, said cradle

mounted on the side of said armrest;

a combination telephone receiver handset and control unit mounted in said open cavity of said cradle, said handset and control unit including a member which cooperates with said hold down member to hold said handset and control unit in said cradle, said handset and control unit comprising:

- a twelve key keypad for inputting numbers to be called;
- a microphone located adjacent one end of said handset;
- a speaker located adjacent the other end of said handset;
- a personal lighting control for switching a passenger reading light;
- a flight attendant call button; and
- a multi-conductor cord passing from said receiver into said armrest through said cradle.

6. A passenger telephone for an airliner as defined in claim 5 wherein said handset additionally comprises:

- a flight attendant cancel button.

7. A passenger telephone for an airliner as defined in claim 6 wherein said handset additionally comprises:

- a volume control; and
- a channel control.

8. A passenger telephone and video game control unit for an airliner, comprising:  
A standard coach passenger seat having a retractable armrest on at least one side thereof;

a cradle forming an open cavity and having a hold down member, said cradle mounted on the side of said armrest;

a combination telephone receiver handset and video game control unit mounted in said open cavity of said cradle, said handset and video game control unit including a member which cooperates with said hold down member to hold said handset and video game control unit in said cradle, said handset and video game control unit comprising:

- a twelve key keypad for inputting numbers to be called;
- a microphone located adjacent one end of said handset;

a speaker located adjacent the other end of said handset;  
a set of video game control switches, including cursor control switches  
and select switches;

a multi-conductor cord passing from said receiver into said armrest  
through said cradle.

9. A passenger telephone for an airliner as defined in claim 8 wherein said handset additionally comprises:

a personal lighting control for switching a passenger reading light; and  
a flight attendant call button.

10. A passenger telephone for an airliner as defined in claim 9 wherein said handset additionally comprises:

a flight attendant cancel button.

11. A passenger telephone for an airliner as defined in claim 10 wherein said handset additionally comprises:

a volume control; and  
a channel control.

12. A passenger telephone for an airliner, comprising:

A standard coach passenger seat having a seat cushion and a retractable armrest  
on at least one side thereof;

a cradle forming an open cavity and having a hold down member, said cradle  
mounted in the side of said armrest;

a reel located in said seat cushion;

a telephone receiver handset mounted in said open cavity of said cradle, said  
handset including a member which cooperates with said hold down member to hold said  
receiver in said cradle, said handset comprising:

a twelve key keypad for inputting numbers to be called;  
a microphone located adjacent one end of said handset;  
a speaker located adjacent the other end of said handset; and  
a multi-conductor cord passing from said receiver to said reel through  
said armrest and said cradle.

13. A passenger telephone for an airliner as defined in claim 12 wherein said

handset additionally comprises:

a personal lighting control for switching a passenger reading light; and  
a flight attendant call button.

14. A passenger telephone for an airliner as defined in claim 13 wherein said  
5 handset additionally comprises:

a flight attendant cancel button.

15. A passenger telephone for an airliner as defined in claim 14 wherein said  
handset additionally comprises:

a volume control; and

10 a channel control.

16. A telephone handset comprising:

a twelve key keypad for inputting numbers to be called;

a microphone located adjacent one end of said handset;

a speaker located adjacent the other end of said handset; and

15 a set of video game control switches, including cursor control switches  
and select switches.

17. A telephone handset comprising:

a twelve key keypad for inputting numbers to be called;

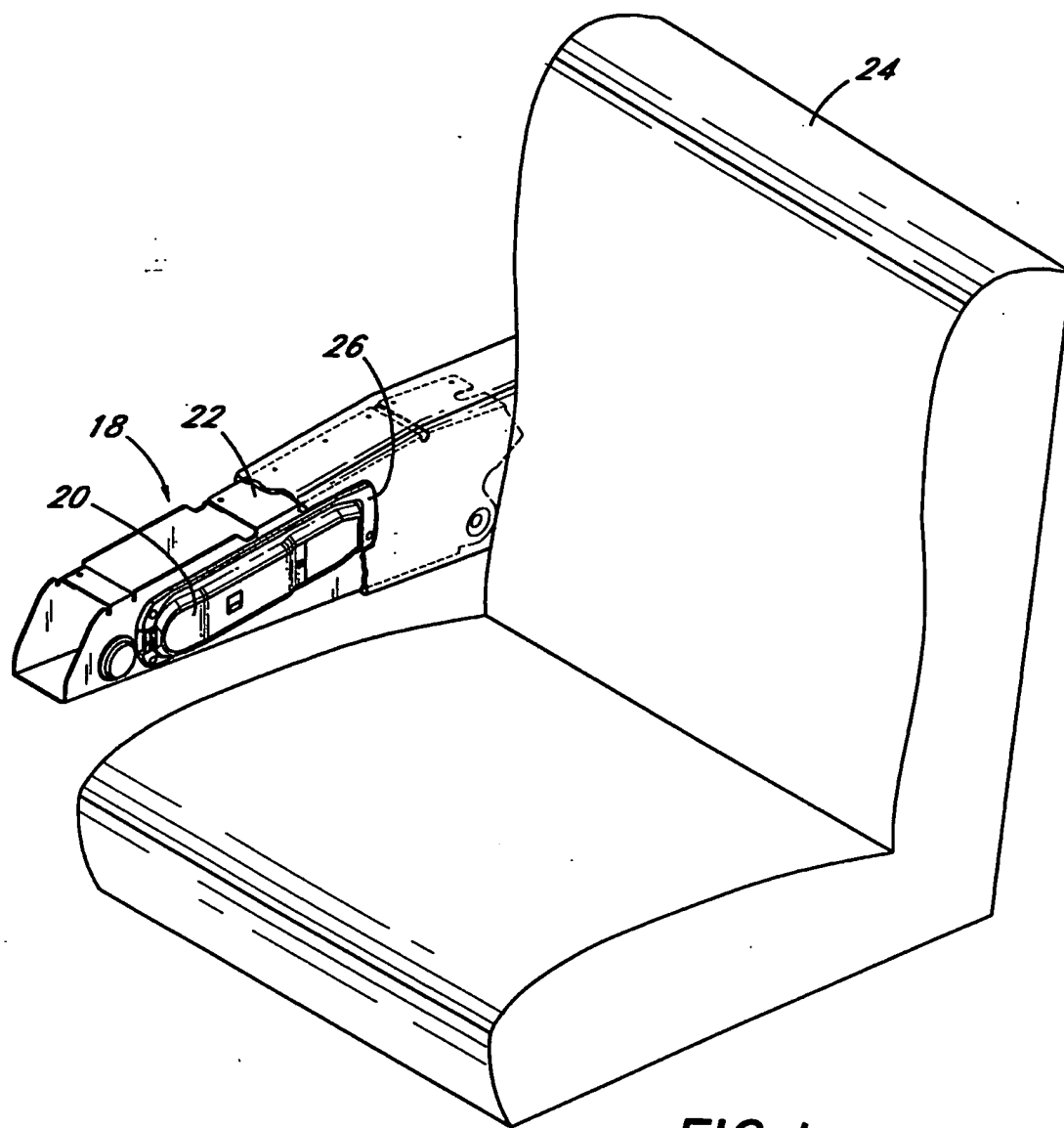
a microphone located adjacent one end of said handset;

20 a speaker located adjacent the other end of said handset;

a lighting control; and

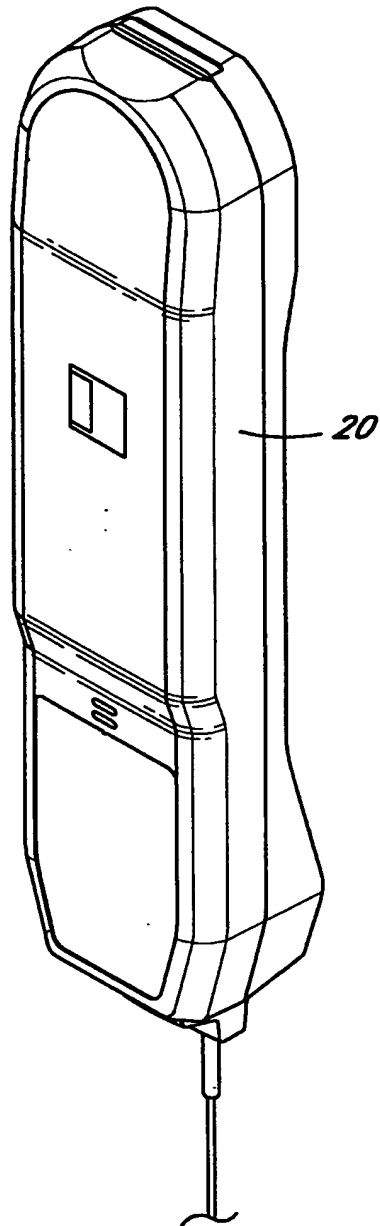
a flight attendant call switch.

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**FIG. 1****SUBSTITUTE SHEET (RULE 26)**

**FIG. 2**

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FIG.3

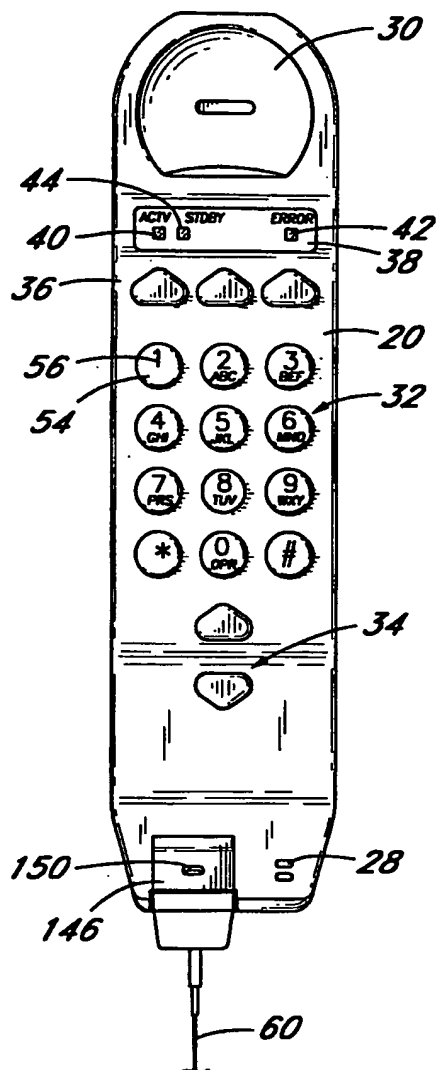
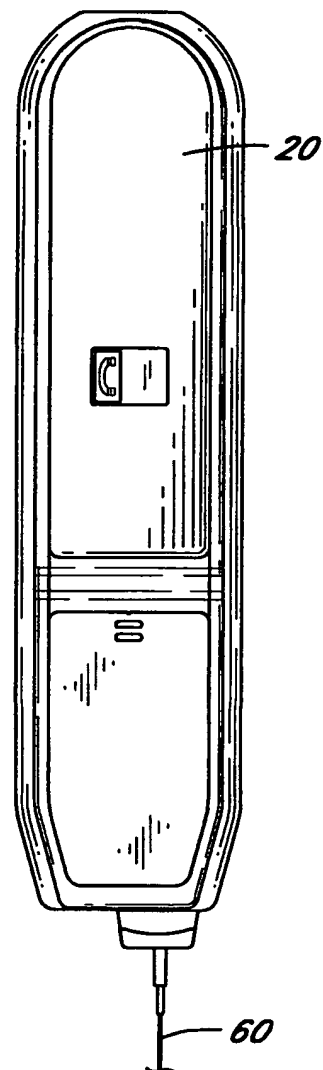


FIG.4



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FIG.5

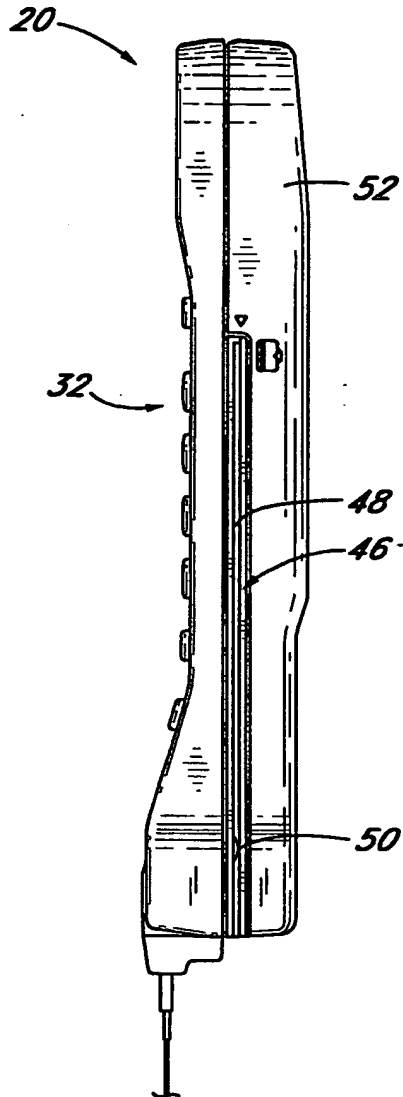
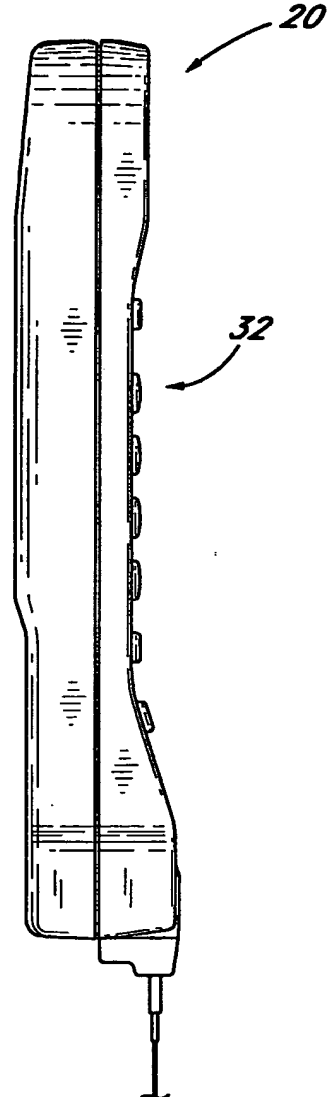


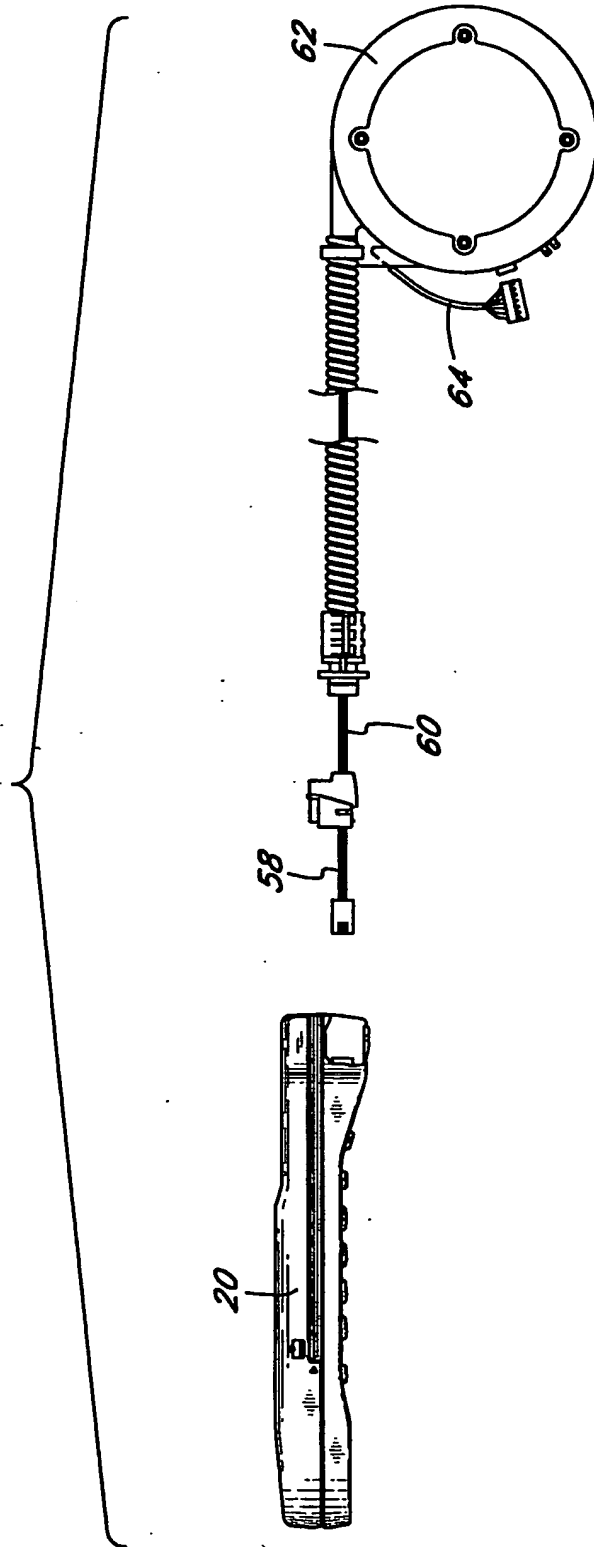
FIG.6



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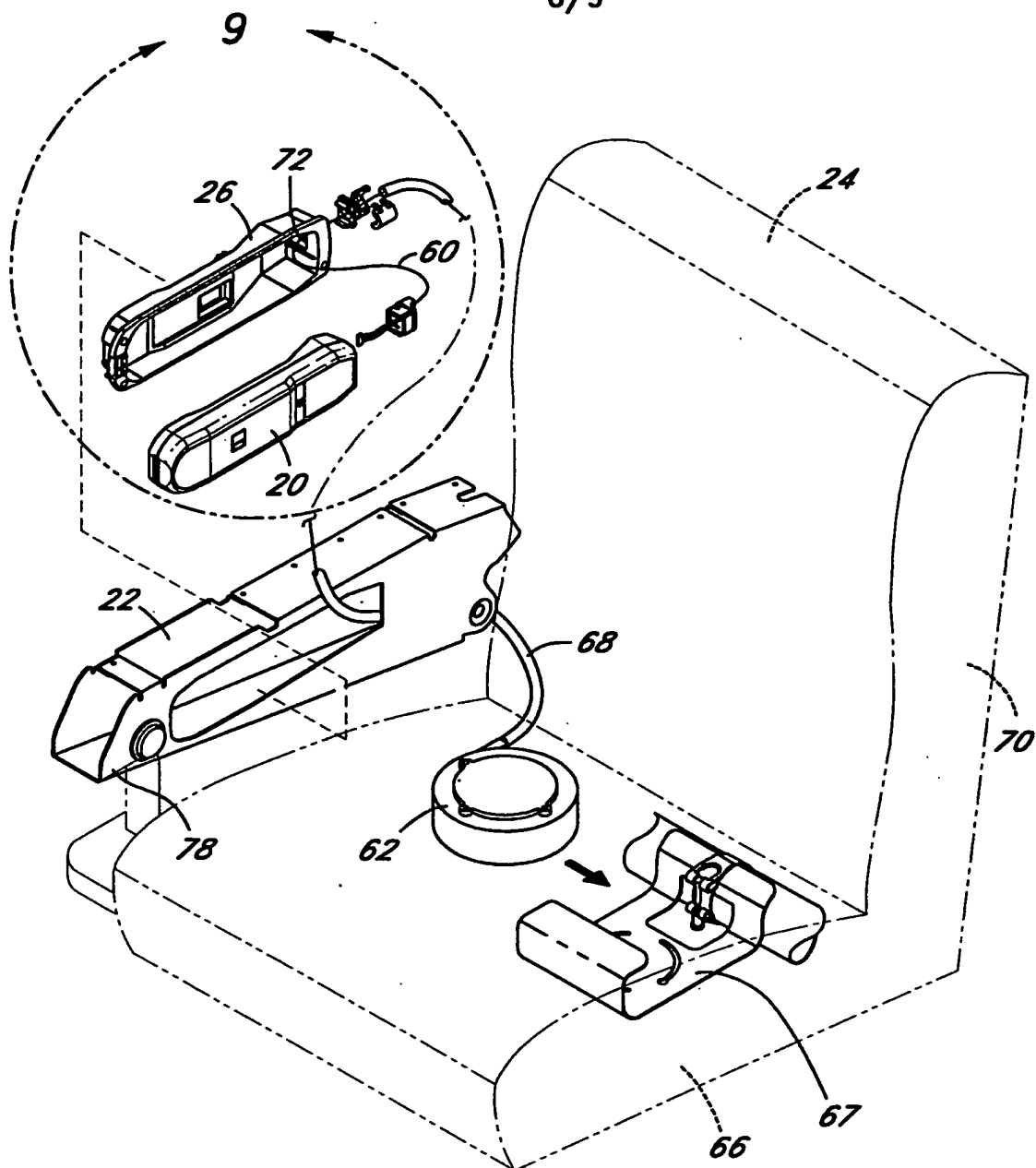
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FIG. 7

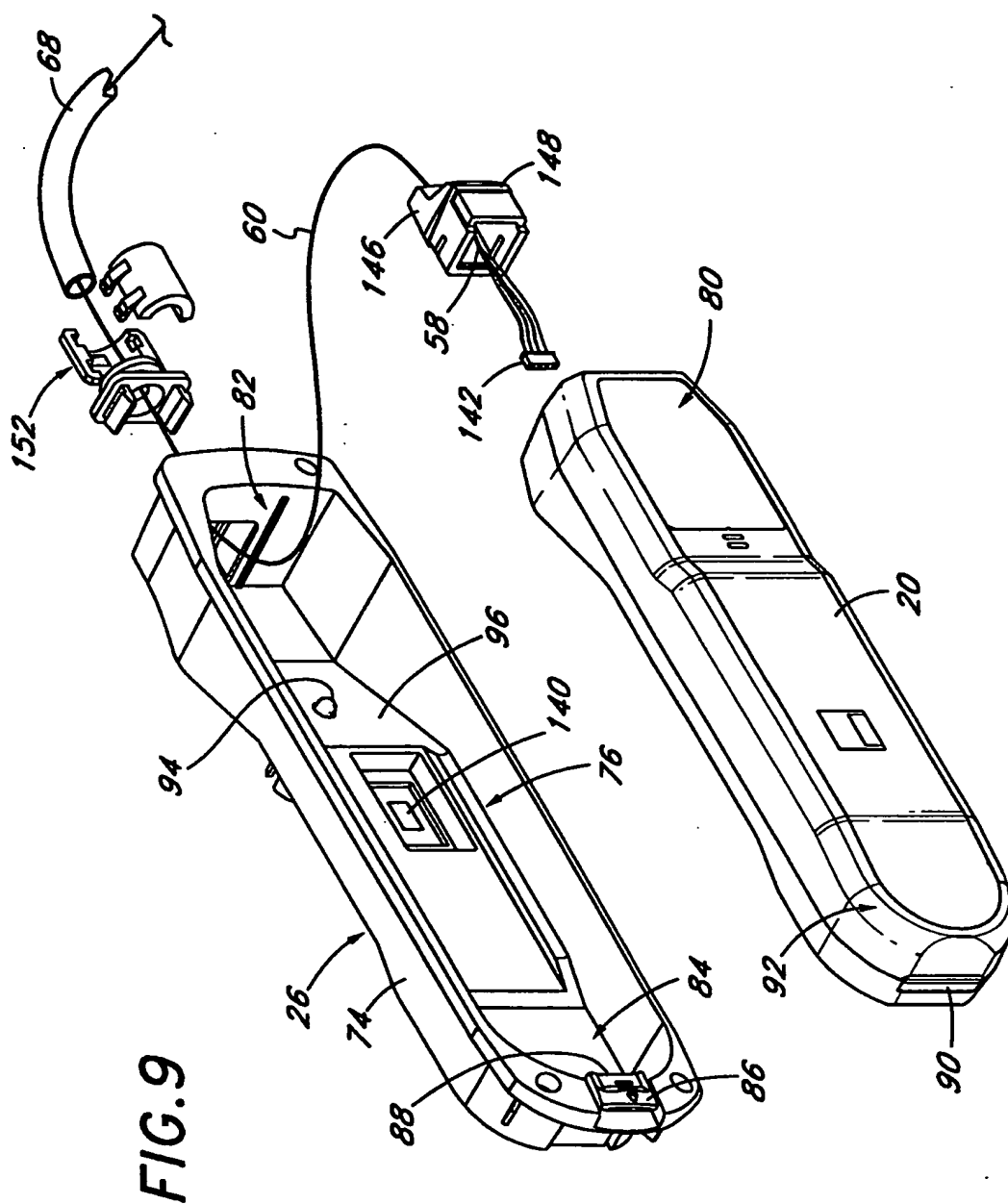


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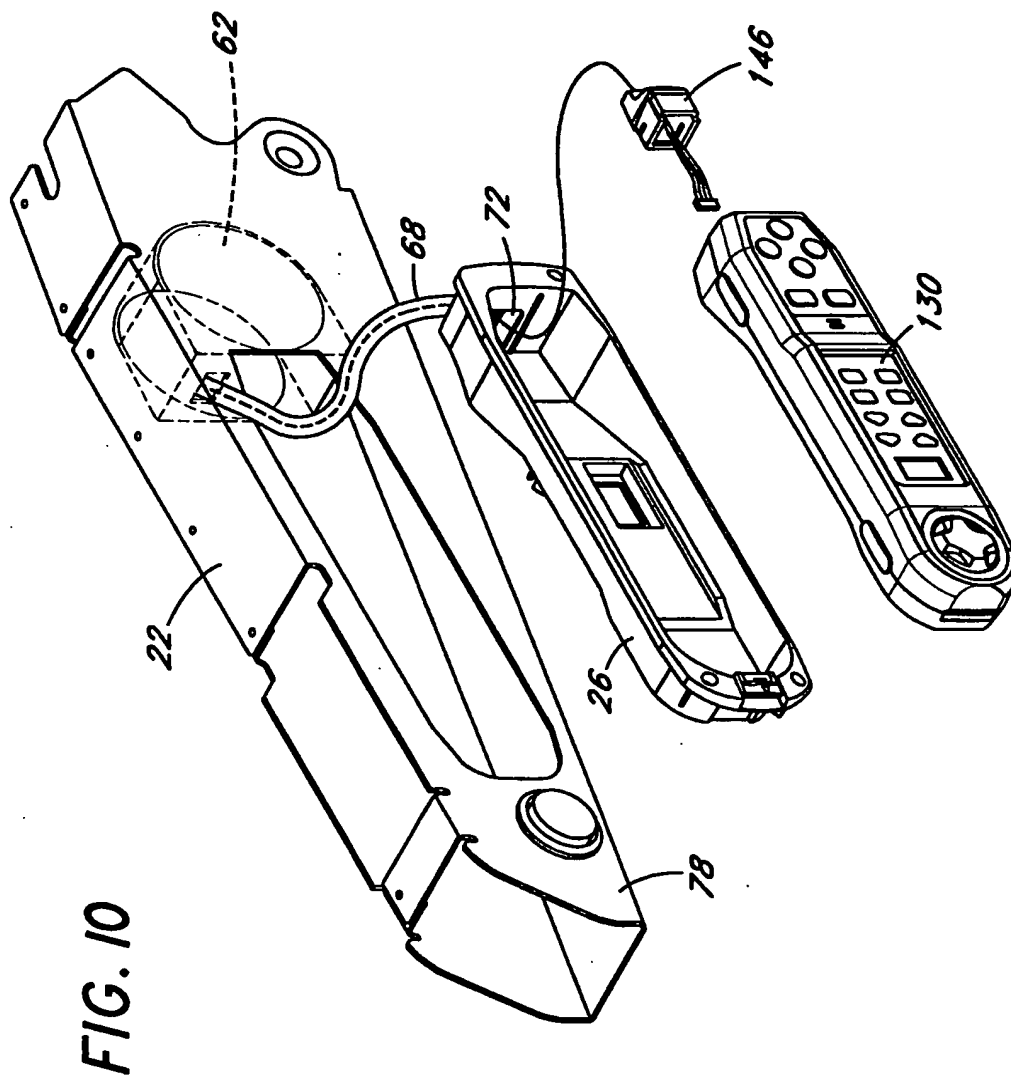
**FIG. 8**

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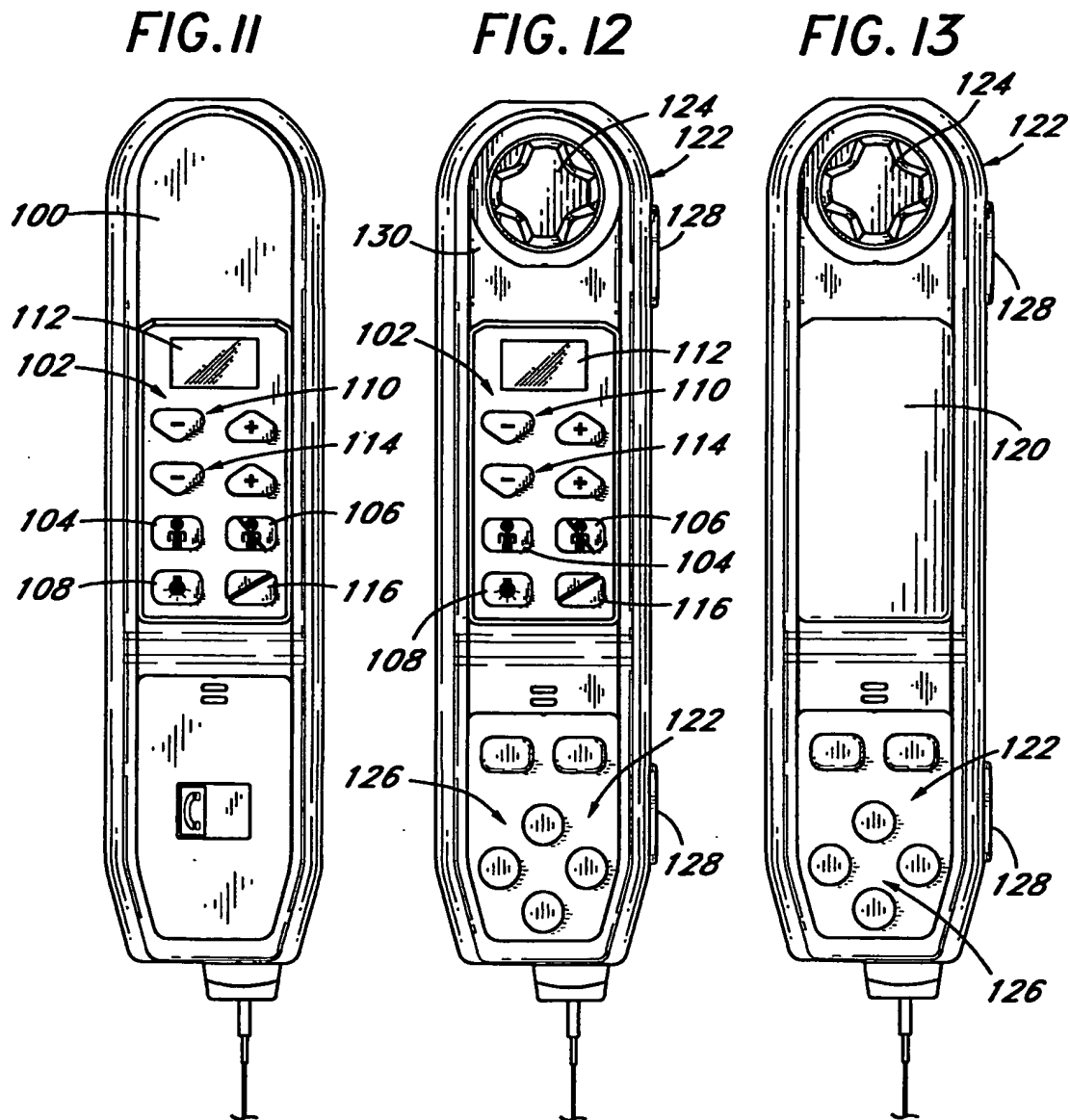
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## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US95/04821

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) : H04M 11/00

US CL : 379/110

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 379/110, 90,440,433,438,446-450,102,58; 348/14.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	"Executive Traveler", Mobile Office Magazine, pp. 54,56,58,62,64,66-68, 4/1992, see pages 62,66,67.	1,8,16
Y		2-7,9-15,17
Y	JP, A, 2-295338 (IGARASHI) 06 December 1990, see abstract.	16
Y	EP,A, 506544-A1 (GUICHARD ET AL) 30 September 1992, see abstract, Fig. 1.	16
Y	US, A, 4,727,569 (KUTRIEB ET AL) 23 February 1988, see col. 3 lines 52-66.	12-15
Y	Television Digest, Volume V33, Issue N33, 16 August 1993, "Nintendo takes to air...and hotels", page 15.	2-7,9-11,13 15,17

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
*A* document defining the general state of the art which is not considered to be part of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*Z* document member of the same patent family
*O* document referring to an oral disclosure, use, exhibition or other means	
*P* document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

17 MAY 1995

Date of mailing of the international search report

22 JUN 1995

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**INTERNATIONAL SEARCH REPORT**

International application No.  
PCT/US95/04821

**C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	O.C. CORR, "Flights of fancy: with 777, entertainment will take on new meaning as electronics moves from cockpit to passengers' seats", The Seattle Times, 7/18/93, newspaper article.	2-7,9-11,13-15,17